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Malnutrition and birth related determinants among children in Qazvin, Iran

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Background: Little is known about the effect of birth weight, birth order and number of siblings on the nutritional status in children in Iran, especially in Qazvin province. The aim of this study was to provide the current data on malnutrition and birth related determinants among children in Qazvin, Iran.
Methods: This study was conducted in six cities of Qazvin province (Iran), during December 2009–December 2010. Data on age, weight and height were taken and birth weight, number of children in family, birth order, parental career and educational state and family caretaker were collected by a questionnaire that a trained team filled in. Sample size was1351, almost 225 children under 6-years-old from each city participated in the study (692 boys and 659 girls). In each city, subjects were randomly selected among children who had profiles at health centers.
Results: The overall prevalence of wasting, stunting and underweight was 10.3%, 5.8% and 4.8% respectively. There was association between 'birth weight' and wasting ($P=0.022$), stunting ($P=0.032$) and underweight ($P<0.001$). A non-significant association was obtained between factors 'number of children at home' and 'birth order' with wasting, stunting and underweight.
Conclusion: These data suggest that birth weight can influence malnutrition indicators; therefore, knowing risk factors of malnutrition in population subgroups is important for planners in country because it helps the future studies concentrate on the most determining ones.

Introduction

The rate of children malnutrition is presumed as an index to consider a country as a developed one. It also represents the socio-economic status of populations. Annually 5 million children die worldwide directly or indirectly due to malnutrition. So the World Health Organization (WHO) identified children malnutrition is the most valuable form of malnutrition among all forms of it.[1] The rate of children malnutrition in western Asia has been reported to be 19%.[2] A survey in 1995 in Iran has estimated the rates of stunting, underweight and wasting nationally to be 18.9%, 15.7% and 6.6% respectively.[3] These children are at high risk of mortality and morbidity, and may carry adverse health and mental consequences in their lives.[4]

A survey in 2012 in Iran has been done and it showed that wasting, as one of malnutrition indices could be reduced by giving children a cooked meal everyday beside the meals they receive at home.[5] Iran is a middle-income country, experiencing rapid epidemiological transition[3] and this quick nutritional status transformation is seen in some middle-east countries such as Saudi Arabia.[6]

Several studies are available on the effect of birth weight, birth order and number of siblings on the nutritional status in children.[7–10] However, little is known about the association of these factors and nutritional status in Iran, especially in Qazvin province. Therefore, this study was conducted to provide the current data on malnutrition and birth related determinants among children in Qazvin, Iran.

Methods

The study was designed to evaluate the main malnutrition indices such as wasting, stunting and underweight and to find the association between birth weight, number of children at home and birth order with those malnutrition indicators in Qazvin province in central Iran (~150 km north-west of Tehran) during December 2009–December 2010.

Sample size determination

Using the formula:

$$n = \frac{(Z_{1-\frac{\alpha}{2}} + Z_{1-\beta})^2 P(1-P)}{d^2}$$

where $\alpha = 0.05$, $\beta = 0.2$, $P = 0.07$ and $d = 0.02$, the sample size was determined to be 1276. On the basis of data mentioned in the introduction, P, may be choose 18.9%, 15.7% or 6.6%. For achieving highest sample size, $P = 0.07$ was considered. Almost 225 children under 6-years-old from each city participated in the study (692 boys and 659 girls). Health centers are part of primary health care (PHC) system in Iran and almost all households have health profiles at health center. In each city, subjects were randomly selected among children who had profiles at health centers. Since almost all children under 6-years-old have health profile at health centers, the selected sample is representative. Twelve assistant groups (two teams for each suburb and two personnel educated in nutritional sciences in each team) were chosen and trained by giving them the questionnaires and teaching them how to fill in. Each team owned two scales, one of them was a beam scale to measure the weight of the children under 2-years-old to put them in lying position on that and the other one to put them in standing position and also they owned a plastic meter to measure the children's height and the heights of children under 2 years was assessed by putting them in lying position and children over 2 years in standing position without shoes (0.1 cm accuracy). Before each measurement, the scales were calibrated with two

Table 3 Birth weight, children number of family and birth order specific rate of wasting, stunting and underweight in children

		Wasting				Stunting				Underweight			
		Moderate and severe		Not wasted		Moderate and severe		Not stunted		Moderate and severe		Not underweight	
		n	%	*n*	%	*n*	%	*n*	%	*n*	%	*n*	%
Birth weight (g)	<2800	27	12.7	185	87.3	16	8	184	92	20	10	180	90
	2800–3500	78	11.4	607	88.6	40	6.3	595	93.7	28	4.4	606	95.6
	>3500	33	7.6	404	92.4	16	3.9	391	96.1	11	2.7	396	97.3
	P-value	0.022				0.032				<0.001			
Number of children at home	One	113	10.3	985	89.7	61	5.9	974	94.1	51	4.9	983	95.1
	≥ Two	25	10.6	211	89.4	11	5.3	196	94.7	8	3.9	199	96.1
	P-value	0.484				0.448				0.326			
Birth order	First	131	10.8	1081	89.2	66	5.9	1056	94.1	56	5	1065	95
	≥ Second	7	5.7	115	94.3	6	5	114	95	3	2.5	117	97.5
	P-value	0.086				0.445				0.159			

Note: Table is based on the results of chi-square test.

Table 4 Birth weight odds ratio by nutritional status

		Wasting			Stunting			Underweight		
		OR	95%CI	*P*-value	OR	95%CI	*P*-value	OR	95%CI	*P*-value
Birth weight (g)	<2800	1[a]			1[a]			1[a]		
	2800–3500	1.79	1.04–3.06	0.034	2.12	1.04–4.34	0.039	4	1.88–8.52	<0.001
	>3500	1.57	1.03–2.41	0.037	1.64	0.91–2.97	0.101	1.66	0.82–3.38	0.159

Note: Table is based on the results of binary logistic regression, adjusted for age and living place.
OR: odds ratio; CI: confidence interval.
a: Reference.

Although in some other reports, there was a significant association between the number of children at home and stunting,[22] it wasn't shown in this study. A significant association has been shown in this research between birth weight and stunting proving that stunting was less prevalent in children with higher birth weight. These findings are in agreement with the earlier reports in Iran and some other countries to study the association between birth weight, birth order and number of children at home with malnutrition indices. They showed that in children with lower birth weight, stunting and underweight is significantly higher[14–23]; furthermore, based on some recent studies, Children's birth weight has been shown to have a significant influence on growth in general. Low-birth-weight (LBW) children experience smaller increments in height and weight and they will possibly remain shorter and lighter with a higher percentage being stunted, underweight or wasted.[24]

Referred to Maddah et al. study on children aged 7–11-years-old as it is concluded in our study, while underweight is still the major concern among younger children, it would be replaced by overweight as they grow up because of fat mass compensating replacement and eventually it could pre-dispose chronic disease in adulthood.[25]

Although the effect of birth weight, birth order, number of siblings, place of birth, mother's education and fathers occupation on the nutritional status in children has been shown in some previous studies in other countries,[7–10] only birth weight was associated with nutritional status in the present study. This may be attributed to the differences of race and ethnicity in Qazvin province. More longitudinal studies are needed to better understand these associations.

Strengths of this study are that it has a wide range of age and also it contains of acceptable quantity of samples. This study has some limitations such as there was no data for children's head circumference. It is apparently proved that head circumference is a crucial index to evaluate the growth and malnutrition in children under two-years-old; Furthermore, it did not contain of family income and parental height and weight; also there was no document of the parents during their childhood whether they were malnourished in that time or not.

In conclusion, the results of the present study showed that: (i) malnutrition indices in Qazvin are approximately low compared with the whole country, (ii) birth weight can affect malnutrition indices and (iii) it is much helpful to overview these three factors in coming articles and observe them watchfully to prove them as one of the malnutrition risk factors eventually.

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Conflicts of interest: None declared.

Key points

- Malnutrition indices in Qazvin are approximately low compared with the whole country.
- Factors such as birth weight can affect malnutrition indices.
- It is much helpful to overview birth related factors in coming articles and observe them watchfully to prove them as one of the malnutrition risk factors eventually.